

WHAT IS CLAIMED IS:

1. A method for implementing a state model for managing a network, said method comprising:

presenting a user interface on a management system to enable a user to define at least one state model for managing at least one network element based on a determined state of at least one network element;

presenting a user interface on said management system to enable a user to define at least one poll service that includes at least one of said at least one state model; and executing said at least one poll service to manage said at least one network element.

2. The method of claim 1, wherein said steps of presenting a user interface on management system comprises:

presenting said user interface on a central management system that is communicatively coupled to at least one distributed polling gateway.

3. The method of claim 2 further comprising:

distributing said at least one poll service defined by said user to said at least one distributed polling gateway for execution thereon.

4. The method of claim 3 further comprising:

distributing said at least one poll service defined by said user to a plurality of distributed polling gateways for execution thereon.

5. The method of claim 4 wherein said gateways each have the ability to communicate with one or more network elements in a particular one of communication protocols selected from the group consisting of: SNMP protocol and CMIP protocol.

6. The method of claim 3 wherein said at least one distributed polling gateway filters data for said central management system.

7. The method of claim 6 wherein said at least one distributed polling gateway communicates data satisfying said at least one state model to said central management system.

8. The method of claim 3 wherein said at least one distributed polling gateway uses software to evaluate a user-defined state model condition to determine whether to use each of said at least one state model.

9. The method of claim 8 wherein said state model condition specifies that said at least one state model is to be executed only for particular network elements.

10. The method of claim 3 wherein said at least one distributed polling gateway operates to retrieve from said at least one network element needed values for values defined for said at least one state model.

11. The method of claim 10 wherein said at least one distributed polling gateway executes software to evaluate one or more user-defined equations for said at least one state model utilizing the retrieved variable values.

12. The method of claim 3 wherein said at least one distributed polling gateway executes software to evaluate one or more user-defined state transition conditions for said at least one state model to determine whether said one or more user-defined state transition conditions are satisfied.

13. The method of claim 12 wherein if said at least one distributed polling gateway determines that said one or more user-defined state transition conditions are not satisfied, then the state of said at least one network element remains unchanged.

14. The method of claim 12 wherein if said at least one distributed polling gateway determines that said one or more user-defined state transition conditions are satisfied, then a state transition for said at least one network element is triggered.

15. The method of claim 14 wherein one or more user-defined transition actions for said state transition are triggered in response to said state transition.

16. The method of claim 12 wherein if said at least one distributed polling gateway determines that said one or more user-defined state transition conditions are satisfied in a user-defined number of consecutive polls of said at least one network element, then a state transition for said at least one network element is triggered.

17. The method of claim 16 wherein one or more user-defined transition actions for said state transition are triggered in response to said state transition.

18. The method of claim 1 wherein said presenting a user interface on a management system to enable a user to define at least one state model, further comprises:

providing a user interface that allows a user to define a plurality of states within a state model for a network element;

5 providing a user interface that allows a user to define at least one transition condition that specifies when a transition from one state to another state is to occur; and

providing a user interface that allows a user to define at least one transition action to be performed upon the occurrence of a transition.

19. The method of claim 1 further comprising:

correlating various different state models.

20. The method of claim 19 wherein software code executes on at least one distributed polling gateway communicatively coupled to a central management system to perform said correlating.

21. The method of claim 20 wherein said software code triggers an action upon a user-defined pattern of states of said various different state models being achieved.

22. The method of claim 21 wherein said action includes any one or more selected from the group consisting of:

generating a user alert, clearing a user alert, starting particular services for said at least one network element, stopping particular services for said at least one network element,
5 changing the interval utilized to poll said at least one network element, enabling a particular poll service for said at least one network element, disabling a particular poll service for said at least one network element, enabling a particular state model for said at least one network element, disabling a particular state model for said at least one network element, triggering one or more user-defined commands to be executed, triggering communication of an email message to personnel, triggering a page of personnel, logging achievement of said pattern of steps to a file, and performing network element configuration.

23. The method of claim 1 wherein said at least one network element includes a network element selected from the group consisting of:

ATM, Sonet, router, modem, CMIP EMS, switch, OSS, NMS, and web server.

24. The method of claim 1 wherein said user interface is a graphical user interface.

25. The method of claim 1 wherein said at least one state model includes:

software code specifying at least two user-defined states for a network element;

software code specifying at least one transition from a first of said at least two user-defined states to a second of said at least two user-defined states; and

5 software code specifying at least one transition action to be performed upon the occurrence of said at least one transition.

26. The method of claim 25 wherein said transition action includes any one or more selected from the group consisting of:

generating a user alert, clearing a user alert, starting particular services for said at least one network element, stopping particular services for said at least one network element, changing the interval utilized to poll said at least one network element, enabling a particular poll service for said at least one network element, disabling a particular poll service for said at least one network element, enabling a particular state model for said at least one network element, disabling a particular state model for said at least one network element, triggering one or more user-defined commands to be executed, triggering communication of an email message to personnel, triggering a page of personnel, logging achievement of said pattern of s to a file, and performing network element configuration.

27. The method of claim 25 wherein said transition action includes any one or more selected from the group consisting of:

enabling a particular poll service for said at least one network element, disabling a particular poll service for said at least one network element, enabling a particular state model for said at least one network element, disabling a particular state model for said at least one network element, and triggering one or more user-defined commands to be executed.

28. The method of claim 1 wherein said executing said at least one poll service further includes:

triggering execution of said poll service in response to the occurrence of a user-defined event.

29. The method of claim 28 wherein said user-defined event includes a particular fault condition defined by a user.

30. The method of claim 1 wherein said at least one poll service is executed only if a user-defined activation condition for said at least one poll service is satisfied.

31. The method of claim 30 wherein said user-defined activation condition specifies that said poll service is for a particular type of network element.

32. The method of claim 1 wherein said management system enables a user to dynamically define said at least one poll service during runtime.

33. The method of claim 1 wherein said management system enables a user to dynamically define said at least one state model during runtime.

34. The method of claim 1 wherein said management system enables a user to dynamically modify an existing poll service or state model during runtime.

35. A method for enabling state-based management of a network, wherein network elements are managed based on their state, said method comprising:

receiving input from a user at a management system to define at least one state model for managing at least one network element based on a determined state of said at least one network element;

receiving input from a user at said management system to define at least one poll

ice that includes at least one of said at least one state model; and

executing said at least one poll service to manage said at least one network element.

36. The method of claim 35, wherein said management system is a central management system that is communicatively coupled to at least one distributed polling gateway.

37. The method of claim 36 further comprising:

distributing said at least one poll service defined by said user to said at least one distributed polling gateway for execution thereon.

38. The method of claim 37 wherein said at least one distributed polling gateway filters data for said central management system.

39. The method of claim 38 wherein said at least one distributed polling gateway only communicates data satisfying said at least one state model to said central management system.

40. The method of claim 37 wherein said at least one distributed polling gateway executes software to evaluate one or more user-defined state transition conditions for said at least one state model to determine whether said one or more user-defined state transition conditions are satisfied.

41. The method of claim 40 wherein if said at least one distributed polling gateway determines that said one or more user-defined state transition conditions are satisfied, then a state transition for said at least one network element is triggered.

42. The method of claim 41 wherein one or more user-defined transition actions aid state transition are triggered in response to said state transition.

43. The method of claim 35 wherein said received input from said user to define at least one state model comprises:

input to define a plurality of states within a state model for a network element;

input to define at least one transition condition that specifies when a transition from

5 one state to another state is to occur; and

input to define at least one transition action to be performed upon the occurrence of a transition.

44. The method of claim 35 further comprising:

correlating various different state models.

45. The method of claim 44 wherein software code executes on at least one distributed polling gateway communicatively coupled to a central management system to perform said correlating.

46. The method of claim 45 wherein said software code triggers an action upon a user-defined pattern of states of said various different state models being achieved.

47. The method of claim 46 wherein said action includes any one or more selected from the group consisting of:

generating a user alert, clearing a user alert, starting particular services for said at least one network element, stopping particular services for said at least one network element, changing the interval utilized to poll said at least one network element, enabling a particular service for said at least one network element, disabling a particular poll service for said at least one network element, enabling a particular state model for said at least one network element, disabling a particular state model for said at least one network element, triggering one or more user-defined commands to be executed, triggering communication of an email message to personnel, triggering a page of personnel, logging achievement of said pattern of states to a file, and performing network element configuration.

48. A system for managing network elements based on their state, said system comprising:

at least one network element;

one or more distributed gateways for monitoring said at least one network element,

5 said one or more distributed gateways communicatively coupled to a central management system;

at least one state model executing on said one or more distributed gateways for managing said at least one network element based on a determined state of said at least one network element.

49. The system of claim 48 further comprising:

software executing on said central management system to enable a user to define said at least one state model, wherein once a user defines said at least one state model, it is communicated to said one or more distributed gateways for execution thereon.

50. The system of claim 48 wherein said one or more distributed gateways further include at least one user defined poll service that includes one or more of said at least one state model.

51. The system of claim 50 further comprising:

software executing on said central management system to enable a user to define said at least one poll service, wherein once a user defines said at least one poll service, it is communicated to said one or more distributed gateways for execution thereon.

52. The system of claim 48 wherein said one or more distributed polling gateways only communicate data satisfying said at least one state model to said central management system.

53. The system of claim 48 wherein said one or more distributed polling gateways execute software to evaluate one or more user-defined state transition conditions for said at least one state model to determine whether said one or more user-defined state transition conditions are satisfied.

54. The system of claim 53 wherein if said one or more distributed polling gateways determine that said one or more user-defined state transition conditions are satisfied, then a state transition for said at least one network element is triggered.

55. The system of claim 54 wherein one or more user-defined transition actions for said state transition are triggered in response to said state transition.

56. The system of claim 48 wherein said one or more distributed polling gateways further comprises:

at least one pattern-based state model executing thereon to correlate various different state models.

57. The system of claim 56 wherein said at least one pattern-based state model specifies a user-defined pattern of states of said various different state models, and wherein said at least one pattern-based state model triggers an action upon said user-defined pattern of states being achieved.

58. The system of claim 57 wherein said action includes any one or more selected from the group consisting of:

generating a user alert, clearing a user alert, starting particular services for said at least one network element, stopping particular services for said at least one network element,
5 changing the interval utilized to poll said at least one network element, enabling a particular poll service for said at least one network element, disabling a particular poll service for said at least one network element, enabling a particular state model for said at least one network element, disabling a particular state model for said at least one network element, triggering or more user-defined commands to be executed, triggering communication of an email message to personnel, triggering a page of personnel, logging achievement of said pattern of messages to a file, and performing network element configuration.

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59. Method for performing state-based management of a network, wherein network elements are managed based on their state, said method comprising:

executing at least one user-defined state model for managing at least one network element based on a determined state of said at least one network element, wherein said executing at least one user-defined state model includes polling said at least one network element for data, evaluating said data to determine whether a user-defined state transition condition is satisfied, and triggering a state transition if said user-defined state transition condition is satisfied for a user-defined number of consecutive polls of said at least one network element.

60. The method of claim 59 wherein said user-defined number of consecutive polls is a plurality of polls.

61. The method of claim 59 further comprising:

software executing on a central management system to enable a user to define said at least one state model, wherein once a user defines said at least one state model, it is communicated to one or more distributed gateways that are communicatively coupled to said central management system for execution on said one or more distributed gateways.

62. The method of claim 59 wherein if said user-defined state transition condition is satisfied for a user-defined number of consecutive polls of said at least one network element, then one or more user-defined transition actions for the user defined state transition are triggered.

63. The method of claim 62 wherein said one or more transition actions include any one or more selected from the group consisting of:

generating a user alert, clearing a user alert, starting particular services for said at least one network element, stopping particular services for said at least one network element,
5 changing the interval utilized to poll said at least one network element, enabling a particular poll service for said at least one network element, disabling a particular poll service for said at least one network element, enabling a particular state model for said at least one network element, disabling a particular state model for said at least one network element, triggering or more user-defined commands to be executed, triggering communication of an email message to personnel, triggering a page of personnel, logging achievement of said pattern of 10 es to a file, and performing network element configuration.

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